METHOD AND APPARATUS FOR NETWORK TRAFFIC OFFLOADING

TECHNOLOGICAL FIELD

[0001] An example embodiment of the present invention relates generally to techniques for accessing a network and, more particularly, to a method and apparatus for managing network traffic offloading.

BACKGROUND

[0002] The amount of wireless traffic is predicted by some to increase by a factor of 1000 from 2010 to 2020 and cellular operators are increasingly seeking solutions to cope with this increasing volume. The rapidly increasing data traffic volume over cellular networks has brought increased attention to unlicensed bands, such as the ISM (industrial, scientific and medical) band from licensed band cellular operators. In 3GPP (3rd Generation Partnership Project) there is ongoing discussion about the potential of using unlicensed spectrum to benefit cellular networks. For example, integrating WLAN (wireless local area networks) into cellular networks could allow cellular network data to be offloaded to unlicensed bands to relieve network strain.

[0003] However, offloading data traffic to unlicensed bands without resulting in noticeable performance loss, or even with a performance gain, can be problematic. More specifically, it can be challenging to maintain the QoS (quality of service) levels that cellular customers are accustomed to when offloading network data to WLAN due to operational differences between WLAN and cellular systems.

BRIEF SUMMARY

[0004] A method, apparatus and computer program product are therefore provided according to an example embodiment of the present invention for managing network traffic offloading. In this regard, the method, apparatus, and computer program product may determine whether a data flow should be offloaded from a first access point to a second access point. Following offloading, the method, apparatus, and computer program product may monitor a perceived QoS of the data flow and perform a remedial action if the QoS does not satisfy a predetermined threshold. The various embodiments thus provide efficient and effective solutions to managing network traffic offloading in a way that may maintain QoS during and after the offloading.

[0005] In one embodiment, a method is provided that includes determining, based at least in part on a QoS (Quality of Service) mapping scheme, whether a data flow should be offloaded from a first access point to a second access point; and, in an instance in which it is determined that the offload should be performed: causing the data flow to be offloaded to the second access point according to the QoS mapping scheme, causing a perceived QoS of the data flow to be monitored, and, in an instance in which the perceived QoS does not satisfy a predetermined desired QoS threshold, causing a remedial action to be performed.

[0006] In a further embodiment, an apparatus is provided that includes at least one processor and at least one memory including program code instructions, the at least one memory and the program code instructions being configured to, with the processor, direct the apparatus to at least determine, based at least in part on a QoS (Quality of Service) mapping scheme, whether a data flow should be offloaded from a first access point to a second access point; and, in an instance in which it is determined that the offload should be performed: cause the data flow to be offloaded to the second access point according to the QoS mapping scheme, cause a perceived QoS of the data flow to be monitored, and, in an instance in which the perceived QoS does not satisfy a predetermined desired QoS threshold, cause a remedial action to be performed.

[0007] In an even further embodiment, a computer program product is provided that includes a non-transitory computer readable medium storing program code portions therein. The computer program code instructions are configured to, upon execution, direct an apparatus to at least determine, based at least in part on a QoS (Quality of Service) mapping scheme, whether a data flow should be offloaded from a first access point to a second access point; and, in an instance in which it is determined that the offload should be performed: cause the data flow to be offloaded to the second access point according to the QoS mapping scheme, cause a perceived QoS of the data flow to be monitored, and, in an instance in which the perceived QoS does not satisfy a predetermined desired QoS threshold, cause a remedial action to be performed.

[0008] In a still further embodiment, an apparatus is provided that includes means for determining, based at least in part on a QoS (Quality of Service) mapping scheme, whether a data flow should be offloaded from a first access point to a second access point; and means for, in an instance in which it is determined that the offload should be performed: causing the data flow to be offloaded to the second access point according to the QoS mapping scheme, causing a perceived QoS of the data flow to be monitored, and, in an instance in which the perceived QoS does not satisfy a predetermined desired QoS threshold, causing a remedial action to be performed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Having thus described example embodiments of the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

[0010] FIG. 1 is a schematic representation of a system that may support example embodiments of the present invention;

[0011] FIG. 2 is a block diagram of an electronic device that may be configured to implement example embodiments of the present invention;

[0012] FIG. 3 is a block diagram of an apparatus that may be embodied by or associated with an electronic device, and may be configured to implement example embodiments of the present invention; and

[0013] FIG. 4 is a flowchart illustrating the operations performed in accordance with embodiment of the present invention.

DETAILED DESCRIPTION

[0014] Some embodiments of the present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all, embodiments of the invention are shown. Indeed, various embodiments of the invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like reference numerals refer to like elements throughout. As used herein, the terms "data," "content,"